Choosing a Process Historian

A comparison of 4 popular Process Historians and the top 5 decision making criteria most companies use before purchasing.

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Introduction

A Process Historian's job is simple. Collect data from your process, make it available for trending/reporting/analysis, and run indefinitely.

Historians share a basic set of features across all vendors with some specific differences in how data is stored and retrieved, and how the system is configured. The right choice for you is entirely dependent on your specific situation. After we review four of the most popular offerings we will cover the top 5 decision making criteria our customers have used to choose their process historians over the years.

In no particular order, let's take a look at four of the most popular Process Historians on the market today:

Rockwell - FactoryTalk Historian

Configuration, Communication, and Collection

Rockwell's FactoryTalk Historian is built on top of the OSI PI engine which is a proven technology capable of handling high amounts of data throughput.

Out of the box FactoryTalk Historian is optimized to communicate with Allen Bradley hardware and can communicate with almost any device using third party OPC servers.

FactoryTalk Historian utilizes the FactoryTalk Directory infrastructure to manage tags and scan cycles leveraging the "Create Tags Once" methodology to simplify system configuration. Tags can be managed in any of three ways: using the FactoryTalk Administration Console by navigating to the tags directly in a PLC, using the PI System Management Tools and configuring tags using a wizard-style interface, or using an Excel Add-in to manage tags in an Excel worksheet.

FactoryTalk Historian provides High Availability or Mission Critical architectures using redundancy to ensure minimal data loss of data in most situations. Using FactoryTalk Historian ME devices at the plant floor level and FactoryTalk View SE at the information systems level, multi-tier and/or remote data collection applications with the capability of store and forward can be implemented.

Data compression algorithms can be configured to minimize storage space, while deadband ranges can be configured on each tag to store data only when it changes by a certain amount rather than storing every data point.

Licensing

FactoryTalk Historian is licensed based on the number of historical tags required for your system. The smallest license is for 250 tags, with the options from there roughly doubling at each tier up to 100,000 tags per server.

In addition to the number of licensed tags, FactoryTalk Historian allows you to configure calculated tags such as totalizers without using additional licensed values.

Licensing is required for "third-party" (read non-Allen Bradley) devices, such as OPC servers, PLCs from other manufacturers, Modbus devices, DNP 3.0 devices, etc.

Historical data can be accessed via SQL queries using the VantagePoint CLR using a single VantagePoint user license included with Historian SE. If you need to access data via SQL queries using an ODBC connection you will need to purchase the "Advanced Server Option" license as well as client access licenses (CALs) for database access. The CALs are either for a specific number of named users or unlimited users for the specific number of licensed tags.

In addition to Historian licensing you will have an option or requirement from your distributor to purchase support. This is an annual fee giving you access to Rockwell tech support as well as upgrades to your software as they become available.

As with most software packages licensing requirements should be discussed with an integration professional as well as your regional distributor.

Data Access/Visualization

FactoryTalk Historian has a number of data visualization options. If you are using FactoryTalk View you can view trend data using the built-in trend tools.

If you want a more robust tool for trending, reporting, Excel worksheets, etc. you can use FactoryTalk VantagePoint. VantagePoint is a software package with roots in the Wonderware world, built by the same people who created the precursor to their existing package. FactoryTalk Historian SE comes with a single seat VantagePoint license as part of the purchase price, giving you everything you need to get your feet wet.

- VantagePoint gives you an excellent trending tool with a full set of analysis features. In addition to time-series trending VantagePoint has an X-Y Plotter allowing you to compare any tags you desire with the option to create a golden batch based on ideal process conditions.

- VantagePoint has the option to import your data into Excel reports, opening it up to the full range of functionality you are probably familiar with already.

- VantagePoint is a web-based platform with a built-in portal giving you access to any reports you have created with the option to include parameters such as date ranges, tag selection, or any other report parameters you can think of.

In addition to historical data analysis, VantagePoint enables you access to dashboard tools you can use to create rich graphical interfaces for a real-time view of your process.

FactoryTalk Historian also has the ability to work with Excel directly with the purchase of an additional license for the functionality. This allows you to create reports in Excel without spending time learning VantagePoint.

Outside of trending and reporting tools the other main way to access historical data is through database queries. A couple of versions ago FactoryTalk Historian included SQL Server ODBC access out of the box making this form of access extremely easy. For "officially" unconfirmed yet easy to infer reasons, this was likely due to system integrators creating their own software packages competing with VantagePoint (which had recently been acquired by Rockwell). Since then the ODBC connection has been moved to an "Advanced Server License" along with a couple of other features.

To access data using SQL queries, thus making it accessible to other business systems, QA/QC, production, ERP, etc., you can use a feature called the VantagePoint CLR. Basically the VantagePoint CLR is a set of pre-defined queries you can use to access historical data through VantagePoint. The documentation for this feature is very clear and while it adds a few steps to installation and acts as a middleman between you and your data it is pretty easy to use. We have used it on every FactoryTalk Historian installation we have done since its released and all of our customers have been happy with its performance.

As with most Rockwell products FactoryTalk Historian and VantagePoint are well integrated with Microsoft platforms making it difficult to use other databases or operating systems.

Inductive Automation - Ignition

Configuration, Communication, and Collection

Inductive Automation's Historian is integrated with their Ignition platform and is designed to store data in a database instead of flat files.

Data can be collected from almost any device using OPC servers, as well as serial devices using Inductive Automation's Serial Module.

Enabling historical data collection for a tag is as simple as checking a box. Data can also be configured with scaled values, allowing you to use Ignition to handle whatever a PLC programmer might throw at you.

Inductive Automation's Historian can be deployed across an entire enterprise using their SQL Bridge Module. This gives you the ability to access all of your historical data at any facility or implement store and forward for remote sites.

High Availability or Mission Critical architectures are supported using redundant servers to ensure minimal data loss in the event of a power failure or network upset.

With data stored in SQL tables, the database you are using will dictate the data compression levels attainable compared to the proprietary file formats of other historians. With disk space now an essentially unlimited commodity this is no longer the same concern it might have been

five years ago. On the plus side you can query tables directly without having to purchase the additional licensing required by some of the other vendors or by going through various middle-tier applications which can cause performance degradation when reading data from the Historian.

Deadband configuration is available, storing only data points as they change instead of storing every point as it is collected.

Licensing

Inductive Automation's approach to licensing is simple. If you purchase any of their Ignition tiers above "Lite" you get unlimited historical tags included with your system.

The caveat to this is that you will also need a database license, in addition to Ignition licensing. From the basic Community or Express versions of some of the popular database packages, all the way up to a world-wide enterprise solution you can find a database to meet your needs and budget. Your company likely already has this infrastructure in place making Ignition an easy addition to your arsenal.

Many databases are supported and unlike some of the other offerings on the market you are not limited to SQL Server when using Ignition.

Data Access/Visualization

Inductive Automation offers one of the most "open" architectures of any of the major Historian offerings. With data accessible directly through a SQL database you can easily access data for any line-of-business or process programs you are using.

Trending is handled using Ignition's built-in trending tools. This is a powerful tool used to view real-time or historical data with configurable pens. The other great feature of Inductive's architecture is the ability to seamlessly integrate data from your database with historical data on the trend control. While this is possible in other packages with additional licensing requirements, it works out of the box with Ignition. Typically, this is manually entered data from non-Inductive Automation databases, such as QA/QC systems, or other line-of-business applications. This provides you the ability to build a single application that can be used across all levels of your organization to access data at any level of detail from the shop floor to the top floor.

Ignition also gives you the ability to access your data in tabular format with table controls. These controls give you direct access to SQL queries allowing you to access any data you might need in any format you can dream up.

With the Reporting Module (included in each tier with historical tags) you have a powerful reporting engine you can use to build reports for any of the data in your system. Reports can include tables, graphs, and images, use dynamic parameters such as date ranges, and be easily exported to image and PDF formats.

The beauty of the Ignition platform is that all of the data access methods are built-into the system from the start. You are free to build systems on top of the historical data as necessary

and can easily extend functionality into areas like Manufacturing Execution Systems without having to learn an entirely new software package.

Wonderware - Historian

Configuration, Communication, and Collection

Wonderware's historical data system, part of their System Platform architecture, is known simply as Historian. Historian is a proprietary system using flat files to store process data.

Historian allows you to collect and store data from any device using Wonderware's DAServer communication protocols.

Configuring tags can be done in two ways, first through a wizard-style interface using Wonderware's System Management Console. Secondly you can configure tags using an Excel worksheet with the ability to easily import/export tags. Wonderware's Historian makes it easy to scale tags before their values are written to the Historian, easily handling any data situation you might throw at it.

Historian's architecture is adaptable to many situations including multi-site and multi-tier architectures. This allows you to configure Historian nodes at the plant level which can communicate with a Historian instance at the corporate level acting as a central repository for data from all of your facilities. These architectures also enable High Availability and Mission Critical systems built on the Wonderware platform.

Deadband configuration is available, storing only datapoints as they change instead of storing every point as it is collected.

Licensing

Wonderware Historian, like other offerings is licensed based on tag count.

Unlike some of the other packages Wonderware Historian's price begins at free, yes $0.00. You can store data for up to 32 tags without having to purchase or install a license. You are limited to 7 days of data in your Historian database, although if you need more it is possible to copy the data to a different database as necessary.

Beyond the 32 tag license there are various tiers from 500 tags all the way to 2 Million tags each with their own price/support based on your distributor and any price breaks you get through them.

If you are using a non-Wonderware HMI, or are only using Wonderware Historian you will still need to purchase DA Server licensing to communicate with your process equipment with the specifics of what DA Server and licensing you need to be determined on a case by case basis. As always, this is something your integration and distribution partners can help you navigate.

In addition to tag licensing, you will need to purchase licensing based on how you would like to access the data if you want to use some of the more advanced trending tools as outlined below. These licensing details are based on your system and will need to be worked out as part of your overall system design.

Data Access/Visualization

Accessing data in Historian can be accomplished in two ways. First by using Wonderware's Historian Client application which provides rich trending, data analysis and reporting capabilities without requiring any knowledge of database architecture or queries.

As mentioned in the FactoryTalk Historian section, Wonderware's Historian Client package was created by the same team who created the software that became VantagePoint. While there are a few differences in functionality they are largely very similar packages.

Nearly all of your bases are covered with Historian Client. A robust trending tool gives you access to all of your time-series data with access to various analysis tools. You can also use an X-Y Scatter Plot with the ability to generate a "golden batch" comparison for your ideal process conditions.

Second, you can access the data through Microsoft SQL Server using Wonderware's query interface. This allows you to use the historical data in other applications such as lab information management or downtime/OEE tracking systems in conjunction with manually entered data from process operators or technicians. Clear documentation is available showing you how to retrieve your data in different formats and we have used this method with great success on many projects.

Siemens - Simatic Process Historian

Configuration, Communication, and Collection

Siemens' Simatic Process Historian is a complete solution for storing data from their WinCC HMI platform.

Configuring tags in Simatic Process Historian is as simple as checking a box for each tag you want to include in the historical archives. You have the ability to configure data storage rates, and compression as necessary.

Simatic Process Historian's architecture is adaptable to many situations including multi-site architectures. This allows you to configure WinCC nodes at the plant level which can communicate with a Historian instance at the corporate level acting as a central repository for data from all of your facilities. These architectures also enable High Availability and Mission Critical systems including store and forward functionality.

Licensing

Siemens takes a common approach to licensing Simatic Process Historian, with tag count based licensing.

In addition to tag count licensing you have the option for redundancy, and access to a wide variety of data sources with the OPC UA server option.

Data Access/Visualization

Data access with Simatic Process Historian can be accomplished in a number of ways.

First, trend data can be accessed using WinCC's built-in controls. These controls are a powerful way to view your historical data in your existing operator interface.

The second method for data access is using Siemens' Simatic Information Server package. This gives you a robust toolset to view any of your historical data, alongside any database data you may have.

Information Server enables you to build web-based reports based on your Simatic Process Historian data, your WinCC Archive data, or any manually entered, or line-of business application data accessible in your databases. Reports can be accessed through a browser-based interface or automatically distributed via email.

Information Server also provides integration with Microsoft Office, giving you an easy way to integrate information with your Word, Excel, or Powerpoint documents.

Comparison

With some of the major Process Historians covered above, it is time to do some comparison of each offering.

As technology becomes more widely adopted the feature sets of each package begin to converge, implementing features from other packages to remain competitive in today's connected environment. As a result, simply comparing features isn't a very useful exercise.

Most historians now offer multi-tier, multi-site, and High-Availability/Mission Critical architectures. Each system has both simple ways to access data directly in your corresponding HMI and a way to access data outside of your control system with some form of database connectivity.

Some historians have checkbox configuration, some have Excel, and some let you drill-down into your process controllers directly. Given the role of a Process Historian, after initial setup you generally are not going to spend a lot of time adding tags. This means the configuration method is usually not a strong reason to go with one platform over another.

Top 5 Decision Criteria

With all of the options available, what should you consider when looking to implement a Process Historian?

Here is a breakdown of the top 5 most common decision making criteria our customers have used when selecting their Process Historian:

1. Integration

The primary reason most companies choose one Process Historian over another is what software they are using in the rest of the process, facility, or company.

Each company's offering is designed to be well integrated with their other platforms. Basically this means if you are using Allen Bradley PLCs and/or Rockwell Automation's FactoryTalk View HMI platform, FactoryTalk Historian is an easy front-runner.

If you are using Inductive Automation's Ignition, using their built-in functionality is a wise choice.

If you are using Wonderware's System Platform, or InTouch HMI software, Historian is a great fit.

The same follows for Siemens. If you are using WinCC for your HMI Simatic Process Historian will work well for you.

2. Budget - Overall

The second driving factor affecting what software to purchase is budget.

Generally budget will help you determine the rest of your software, taking you back to the level of integration available with each option. With this in mind, you can still find ways to save money on your Process Historian based on your specific case.

If you require a lot of tags, you may find Inductive Automation can save you some money with their unlimited tag licensing model.

Depending on your distributor relationships you may find it cheaper to use FactoryTalk Historian on a project using Allen Bradley PLC's and Wonderware System Platform for your HMI, or vice-versa with Wonderware Historian.

You will need to take a look at each platform in terms of your overall budget constraints and functionality requirements to find the right fit for your project.

3. Budget - Data Access

The other budgetary component in purchasing a Process Historian is the associated cost to access non-process data.

If you have a large amount of external databases, you may find FactoryTalk Historian combined with VantagePoint to be a costly investment, requiring additional licensing to connect to multiple SQL databases.

Instead you might find Inductive Automation, Wonderware, or Siemens packages offer you this functionality at a lower price point without requiring as many licenses.

You will also want to consider any per-seat licensing requirements for your trending/reporting tools as this will also add to your overall costs in many cases.

The other side of this coin is how easily you can access your historical process data from an external source. Querying a database directly can save you on some licensing costs, yet may increase your labor costs on the integration side. Using some of the built-in reporting/query functionality from some of the reporting packages may reverse the licensing/labor costs at the possible expense of a completely "open" system.

As with everything we are discussing, the licensing/labor calculation will need to take into account the skills and expertise of your integration professional. They may also have existing code you can use to save on the overall integration budget, as a lot of data access projects are very similar across software platforms, and even industries.

If you have no external databases these factors generally won't come into play, still it is something to consider when looking at a Process Historian as your first step towards a fully-integrated enterprise.

4. Underlying Technology

In most business cases the underlying technology you use if Microsoft Windows based. All of the platforms will work in this environment, however if you are using a Linux-based system, or Apple Macs you will be limited in your software selection.

If you are not using Windows, you should ask your integration professional for their recommendations, and discuss your situation with your distribution partners as you will have a smaller pool of platforms from which to choose.

5. Personal Preference

The final factor involved in choosing a Process Historian is personal preference.

You may have had a great experience with a certain platform at a different facility, or you may have had a terrible experience. There might be some silver bullet feature from one company's latest release you are interesting in using, or simply want to see if the marketing hype from the latest automation conference is true.

Personal preference is a huge influence on your decision, and should not be taken for granted.

In our experience the only time to argue against personal preference is if there is some other factor ruling out a particular platform. If you need a certain feature that your preferred package doesn't have, this should be taken into account, otherwise it is your system, you will be the one using it for the life of the system, and you should ultimately be happy with your choice.

Wrapping Up

Implementing a Process Historian is usually the first step towards a fully-integrated enterprise. It bridges the gap between automation and optimization. Historical data and information can help you better understand your process, how your operators are handling setpoints, and process upsets, and gives you the foundation to grow into new technology like Manufacturing Execution Systems.

By exposing process data to other databases and line-of-business applications a Process Historian is one of the easiest ways to begin integrating the shop floor with the top floor.